



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Robin J. Guthrie

Docket No.: C-2480

Serial No.: 10/816,403

Art Unit: 1795

Filed: April 1, 2004

Examiner: Keith D. Walker

Title: Fuel Cell Reactant Flow  
Fields That Maximize Planform  
Utilization

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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**APPEAL BRIEF**

Please charge the \$540 fee required by 37 CFR 41.20(b)(2) to  
Deposit Account No. 23-1800.

(1) The real party in interest is UTC Power Corporation,  
South Windsor, Connecticut.

(2) There are no related cases.

(3) Jurisdiction is based on 35 USC 134(a). The appeal is  
from the final rejection dated July 16, 2008. The Notice of Appeal  
was filed April 3, 2009; this Appeal Brief is being filed June 2, 2009.

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#### **(4) TABLE OF CONTENTS**

(1)	Statement of the real party in interest. . . . .	1
(2)	Statement of related cases. . . . .	1
(3)	Jurisdictional statement. . . . .	1
(4)	Table of Contents. . . . .	2
(5)	Table of Authorities. . . . .	2
(7)	Status of Amendments. . . . .	3
(8)	Grounds of rejection to be reviewed. . . . .	3
(9)	Statement of facts. . . . .	3
(10)	Argument. . . . .	4
(11)	Appendix. . . . .	9
	Claims. . . . .	9
	Claim support and drawing analysis. . . . .	13
	Means or Step plus function analysis. . . . .	17
	Evidence. . . . .	17

#### **(5) TABLE OF AUTHORITIES**

No authorities are relied upon herein.

**(7) STATUS OF AMENDMENTS**

No amendments were filed after the rejection appealed from.

**(8) GROUNDS OF REJECTION TO BE REVIEWED**

1. Claims 1, 2 and 6-9, 35 USC102(b)

Fujii (US 6,255,011)

2. Claims 1, 2, 5 and 7-9, 35 USC 102(b)

Yamamoto (WO 01/67532)

(US 2004/0197633 for translation)

3. Claim 5, 35 USC 102(b) or 35 USC 103(a)

Fujii (US 6,255,011)

4. Claims 3 & 4, 35 USC 103(a)

Fujii (US 6,255,011), Tawfik (US 2004/0101736)

5. Claims 3 & 4, 35 USC 103(a)

Fujii (US 6,255,011), Washington (US 5,300,370)

6. Claims 3 & 4, 35 USC 103(a)

Yamamoto (WO 01/67532), Tawfik (US 2004/0101736)

7. Claims 3 & 4, 35 USC 103(a)

Yamamoto (WO 01/67532), Washington (US 5,300,370)

## **(9) STATEMENT OF FACTS**

The only independent claim, claim 1, requires (Fig. 9) "some, (103, 104) but less than all (101) of said transverse portions having more than one groove."

The transverse portions in Fujii (6,255,011) (Fig. 5, 82, 84; Fig. 6, 92, 94) only have one groove each; or (looking at lower parts of 92, 94, Fig. 5) all have two grooves.

Yamamoto (US 2004/0197633) has (Fig. 5): one inlet portion, extending toward upper left from inlet 51a; one outlet portion, extending toward upper left to outlet 51b, and one transverse portion having many grooves 52, 54, 54'. Thus, all the transverse portions have more than one groove.

Tawfik (US 2004/0101736) and Washington (US 5,300,370) are cited to show interdigitated channels. Neither of these references supply the shortfall of Fujii or Yamamoto with respect to claim 1.

Therefore, claim 1 and all the other claims, being dependent on claim 1, are neither anticipated nor obvious.

**(10) ARGUMENT**

Claims 1, 2 and 6-9, 35 USC 102(b)

Fujii (US 6,255,011)

(Argued as a group)

The Examiner erred in the Final Rejection dated 7/16/08, page 3, line 2, *“some of the transverse sections have more than one groove (Fig. 6; 7:25-40).”* The error is in not including “but less than all”, as in line 13 of claim 1.

Applicant previously responded {response of 9/21/07, page 6, lines 8-17} to the same rejection {in Office Action of 6/22/07, ¶ 4}.

Applicant also responded {response of 1/31/08, page 3, line 9 to page 4, line 9} to the same rejection {in Office Action of 12/10/07, page 4, ¶ 1}. Applicant responded further to the 12/10/07 rejection {response of 4/8/08, page 1, line 8 to page 2, line 8}, referring to the Declaration of the inventor, Guthrie, which describes Fujii in comparison with claim 1 herein. Applicant responded again in a Supplemental Response of 4/14/08 by merely submitting the Declaration of Jeffrey Lake (Lake hereinafter) which concisely distinguishes Fujii from claim 1 {Lake, ¶¶ 5-9}.

The transverse sections, called “united sections”, {Fig. 5: 82,84; 7:25-28} have only one groove. The transverse sections {Fig. 6: 92,94; 7:29-37} both have only one groove near the top, and both have two grooves near the bottom. Fujii does not meet “some, but less than all” as required in line 13 of claim 1.

Claim 1 is not anticipated by Fujii and claims 2 and 6-9 are not rendered obvious by Fujii, in any combination.

Claims 1, 2, 5 and 7-9, 35 USC 102(b)

Yamamoto (WO/01/67532)

(US 2004/0197633 for translation)

(Argued as a group)

This is a new reference, a new rejection, in a final action where applicant did not amend any claims in applicant's previous response. Applicant has not previously responded to this rejection.

The only independent claim, claim 1, requires (Fig. 9) “some, (103, 104) but less than all (101) of said transverse portions having more than one groove.”

Yamamoto (US 2004/0197633) has (Fig. 5): one inlet portion, extending toward upper left from inlet 51a; one outlet portion,

extending toward upper left to outlet 51b, and one transverse portion having many grooves 52, 54, 54'. Thus, all the transverse portions have more than one groove, and Yamamoto cannot anticipate claim 1.

Claim 5, 35 USC 102(b) or 35 USC 103(a)

Fujii (US 6,255,011)

This is a new rejection, in a final action where applicant did not amend any claims in applicant's previous response. Applicant has not previously responded to this rejection.

The Examiner erred {Final Rejection of 7/16/08 at page 4, ¶ 3, line 6} where he says of Fujii "*The ratio of channels to grooves is 1.*" It is axiomatic that since claim 1 (parent of claim 5) requires {line 13} "some, but less than all of said transverse portions having more than 1 groove" (Emphasis added), the ratio of grooves to channels in the claimed invention must always be greater than one. Thus, Fujii cannot anticipate claim 5 nor render it obvious.

Claims 3 & 4, 35 USC 103(a)  
Fujii (US 6,255,011), Tawfik (US 2004/0101736)  
(Argued as a group)

The Examiner erred {final rejection of 7/16/08, at page 5, ¶ 4, line 5}: *Tawfik teaches interdigitated channels....*" Applicant first responded to this rejection {response of 9/21/07, page 6, ¶ 5} to this rejection when first made {Office Action of 6/22/07, page 6, ¶ 5}.

Applicant again responded {response of 1/31/08, page 4, ¶ 2} to the same rejection when repeated ipssissimus verba {Office Action of 12/10/07, page 4, ¶ 2}.

Claims 3 & 4, 35 USC 103(a)  
(Fujii (US 6,255,011), Washington (US 5,300,370)  
(Argued as a group)

The Examiner erred {final rejection of 7/16/08 at page 7, lines 6-8; and Office Action of 6/22/07, page 6, ¶ 6}. Applicant first responded to this rejection {response of 9/21/07, page 6, ¶ 6}.

**(11) APPENDIX**

**CLAIMS**

1. **(Rejected)** A fuel cell reactant gas flow field plate for inclusion in a stack of fuel cells to form a fuel cell power plant, said plate having a plurality of grooves forming reactant gas flow channels, said channels having inlet ends and outlet ends for conducting reactant gas along a longitudinal flow direction extending between said inlet ends and said outlet ends;

    said flow field plate having a flow inlet edge and a flow outlet edge, each of said channels including either or both of (a) an inlet portion extending longitudinally from, at or near said inlet edge and (b) an outlet portion extending longitudinally from, at or near said outlet edge, each of said channels having a transverse portion extending substantially transversely of said longitudinal direction and in fluid communication either (c) with only one of said inlet portions or only one of said outlet portions, or (d) between one of said inlet portions and one of said outlet portions, so that said inlet portions are laterally offset from said outlet portions;

    characterized by the improvement comprising:

some, but less than all of said transverse portions having more than one groove.

2. **(Rejected)** A flow field plate according to claim 1 wherein:

    said channels are flow-through channels and each of said transverse portions is in fluid communication between one of said inlet portions and one of said outlet portions.

3. **(Rejected)** A flow field plate according to claim 1 wherein:

    said channels are interdigitated and each of said transverse portions includes at least one groove in fluid communication between  
    (a) a first part of one inlet portion and a second part of said one inlet portion which is transverse from said first part of said one inlet portion or  
    (b) a first part of one outlet portion and a second part of said one outlet portion which is transverse to said first part of said one outlet portion.

4. **(Rejected)** A flow field plate according to claim 3

wherein:

some of said transverse portions include at least one groove which is in fluid communication with only one part of either (a) one of said inlet portions or (b) one of said outlet portions.

5. **(Rejected)** A flow field plate according to claim 1

wherein:

all of said transverse portions together form a transverse flow field area having a length in said longitudinal direction and a width transverse of said longitudinal direction, and a ratio of the number of grooves in said transverse flow field area to the number of transverse channel portions in said transverse flow field area is about the same as an aspect ratio of the length or width of said transverse flow field area to the width or length, respectively, of said transverse flow field area.

6. **(Cancelled)**

7. **(Rejected)** A flow field plate according to claim 1

wherein:

some of said transverse portions have two grooves.

8. **(Rejected)** A flow field plate according to claim 1

wherein:

none of said transverse portions have more than two grooves.

9. **(Rejected)** A flow field plate according to claim 1

wherein:

said plate has at least one hole therein; each hole for forming, with similar holes of additional plates, an internal manifold, each hole having two dimensions which are at least several times said groove width; and

said inlet portions are offset from said outlet portions to clear said holes.

Claim Support and Drawing Analysis

1. A fuel cell reactant gas flow field plate {page 5, lines 2-5; Figs. 6 & 7: 53; Figs. 8 & 9: 82; Fig. 10: 104} for inclusion in a stack of fuel cells to form a fuel cell power plant, said plate having a plurality of grooves {page 5, lines 11-15; Fig. 7: 77-79; Fig. 9: 101-103; Fig. 10: 111, 112, 117, 118} forming reactant gas flow channels {page 5, lines 8-12; Fig. 6: 71; Fig. 8: 98; Fig. 10: 109, 110, 115, 116}, said channels having inlet ends and outlet ends {page 5, lines 4-7; Fig. 6: 61, 62; Fig. 8: 97,99} for conducting reactant gas along a longitudinal flow direction extending between said inlet ends and said outlet ends;

    said flow field plate having a flow inlet edge {at 61, Fig. 6} and a flow outlet edge {at 62, Fig. 6}, each of said channels including either {page 6, lines 23-28; Fig. 10} or both {Figs. 6-9 & 11} of (a) an inlet portion extending longitudinally from, at or near said inlet edge and (b) an outlet portion extending longitudinally from, at or near said outlet edge, each of said channels having a transverse portion {page 5, lines 9-12; Fig. 6 & 7: 73; Figs. 8 & 9: 100; Fig. 10: 121; Fig. 11: 135} extending substantially transversely of said

longitudinal direction and in fluid communication either (c) with only one of said inlet portions {page 7, lines 4-6; Fig 10: 109, 100} or only one of said outlet portions {page 7, lines 6-9; Fig. 10: 115, 116}, or (d) between one of said inlet portions and one of said outlet portions {page 5, lines 8-11; Figs. 6 & 7: 73; Figs. 8 & 9: 100; Fig. 11: 135}, so that said inlet portions are laterally offset from said outlet portions {page 5, lines 8 & 9; page 6, lines 12-14; Figs. 6, 8 and 11};

characterized by the improvement comprising:  
some {page 5, lines 11 & 12; page 6, lines 14-16; page 7, lines 3-6; Fig. 7: 78, 79; Fig. 9: 103, 104; Fig. 10: 110-112, 116-118}, but less than all {Fig. 7: 77; Fig. 9: 101; Fig. 10: 109, 115} of said transverse portions having more than one groove.

2. A flow field plate according to claim 1 wherein:  
said channels are flow-through channels {Fig. 8: 97, 98} and each of said transverse portions {Fig. 8: 101-104} is in fluid communication between one of said inlet portions and one of said outlet portions.

3. A flow field plate according to claim 1 wherein:  
said channels are interdigitated {page 6, lines 23-28; Fig. 10}  
and each of said transverse portions includes at least one groove  
{Fig. 10: 112} in fluid communication between (a) a first part of one  
inlet portion {Fig. 10: 110} and a second part of said one inlet portion  
which is transverse from said first part of said one inlet portion or (b)  
a first part of one outlet portion {Fig. 10: 117, 116} and a second part  
of said one outlet portion which is transverse to said first part of said  
one outlet portion.

4. A flow field plate according to claim 3 wherein:  
some of said transverse portions include at least one groove  
{Fig. 10: 111, 118} which is in fluid communication with only one part  
of either (a) one of said inlet portions {Fig. 10: 110} or (b) one of said  
outlet portions {Fig. 10: 116}.

5. A flow field plate according to claim 1 wherein:  
all of said transverse portions together form a transverse flow  
field area {page 5, lines 9-11; Figs. 6 & 7: 74; page 6, lines 12-20;  
Figs. 8 & 9: 107} having a length in said longitudinal direction and a

width transverse of said longitudinal direction {page 5, lines 17-22; Fig. 8: L, W}, and a ratio of the number of grooves in said transverse flow field area to the number of transverse channel portions in said transverse flow field area is about the same as an aspect ratio of the length or width of said transverse flow field area to the width or length, respectively, of said transverse flow field area.

7. A flow field plate according to claim 1 wherein:  
some of said transverse portions have two grooves {page 5, lines 11, 12; Figs. 6, 7: 78, 79}.

8. A flow field plate according to claim 1 wherein:  
none of said transverse portions have more than two grooves {page 5, lines 11, 12; Figs. 6-11}.

9. A flow field plate according to claim 1 wherein:  
said plate has at least one hole therein; each hole for forming, with similar holes of additional plates, an internal manifold {page 5, lines 2-5; Fig. 6: 57, 58}, each hole having two dimensions {Fig. 6} which are at least several times said groove width; and

said inlet portions are offset from said outlet portions to clear  
said holes {page 5, lines 8, 9; Figs. 6, 8, 11}.

Means or Step Plus Function Analysis

There are no functional elements.

Evidence

Contents:

Declaration of Robin J. Guthrie . . . . .	18
Declaration of Jeffrey Lake . . . . .	21



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Robin J. Guthrie

Docket No.: C-2480

Serial No.: 10/816,403

Art Unit: 1795

Filed: April 1, 2004

Examiner: Keith D. Walker

Title: Fuel Cell Reactant Flow Fields That  
Maximize Planform Utilization

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Robin J. Guthrie declare that:

1. I reside at 7 Lexington Road, East Hartford, CT 06118
2. I have a Bachelor of Science degree in Mechanical Engineering and have been working in the field of fuel cells and related arts for over 33 years, and am currently engaged in that field on behalf of UTC Power Corporation, South Windsor, CT.
3. I have familiarized myself with the subject matter of the above-identified application, as claimed in an amendment filed September 21, 2007.
4. I have familiarized myself with the content of US patent 6,255,011 (Fujii).
5. Claim 1 defines a fuel cell reactant gas flow field plate:
  - grooves form flow channels;
  - the channels conduct fuel in a longitudinal flow direction between inlet ends and outlet ends;
  - the plate has inlet and outlet edges;
  - each channel has a longitudinal inlet portion and/or a longitudinal outlet portion, extending respectively from the inlet edge or the outlet edge;
  - each channel has a portion transverse to the longitudinal flow direction and connected to an inlet portion and/or an outlet portion;
  - the transverse portions may have more than one groove.

6. References to columns (e.g. 7) and lines (e.g. 41-43) will hereinafter be made thusly (7:41-43).

7. Fig. 6 of Fujii has inlet grooves 44a-44f extending in the horizontal direction from the fuel inlet 36a (3:54, 55) and has outlet grooves 50a-50f extending in a horizontal direction to the fuel gas outlet 36b (4:2-4).

8. "... fuel gas passes through the first gas flow passage grooves 44a-44f, and it is smoothly and uniformly merged into the first and second united sections 92, 94". (7:41-43)

9. "The flow passage cross-sectional area is increased as the first gas flow passage grooves 44a-44f are merged (in the downward direction)." (7:35-37) (Emphasis added)

10. Merriam-Webster's Collegiate, 11<sup>th</sup> edition, defines "transverse" as "at right angles to the long axis of a body." "Downward" in Fujii is at right angles to "horizontal" in Fujii.

11. From the facts set forth in the portions of Fujii cited in paragraph 7-9 above, it is clear that Fujii conducts fuel in horizontal inlet portions 44a-44f and in horizontal outlet portions 50a-50d which are connected by downward united sections 92, 94.

12. The downward direction is in the direction of arrow A in Fig. 6 parallel with the short side, and the horizontal direction is in the direction of arrow B parallel with the long side (3:1-5).

13. The grooves 44a-44f, 50a-50d in Fujii therefore conduct "reactant gas along a longitudinal flow direction extending between said inlet ends and said outlet ends." (Claim 1, lines 3 and 4)

14. Fujii's plate 90 has an inlet edge, near inlet 36a, and an outlet edge, near outlet 36b.

15. Fujii's grooves 44a-44f comprise channels "extending longitudinally from...near said inlet edge...." (claim 1, lines 6 and 7)

16. Fujii's grooves 50a-50d comprise channels "extending longitudinally from...near said outlet edge...." (claim 1, lines 7 and 8)

17. Fujii has a transverse portion 94 for three inlet grooves 44a-c, connecting them to two outlet grooves 50c, 50d, and has a transverse portion 92 for three inlet grooves 44d-44f, connecting them to two outlet grooves 50a, 50b.

18. The channels of paragraphs 15 and 16 above (44a-44f, 50a-50d) do NOT each have "a transverse portion extending substantially transversely of said longitudinal direction and in fluid communication either (c) with only one of said inlet portions or only one of said outlet portions, or (d) between one of said inlet portions and one of said outlet portions...." (Claim 1, lines 8-11)

19. If one were to consider Fujii's grooves 44a-44c as one channel and grooves 44d-44f as a second channel, then one channel has a single transverse groove 94 and the second channel has a single transverse groove 92; this does not meet: "*some...transverse portions having more than one groove.*" (Claim 1, line 13)

20. If the vertical portions of grooves 50a and 50b, or of grooves 50c and 50d, were considered to be the transverse portions, this would not meet "*but less than all having more than one groove.*" (Claim 1, line 13)

21. It is evident from the facts set forth in paragraphs 7-20 that there is no construction of Fujii that has "*some, but less than all of said transverse portions having more than one groove*" as called for in line 13 of claim 1.

22. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Robin J. Guthrie  
Robin J. Guthrie

April 3, 2008  
Date



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

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Docket No.: C-2480

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Art Unit: 1795

Filed: April 1, 2004

Examiner: Keith D. Walker

Title: Fuel Cell Reactant Flow Fields That  
Maximize Planform Utilization

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Jeffrey Lake declare that:

1. I reside at 7 Hale Street, Ext, Vernon CT.
2. I have a Master of Science degree in Mechanical Engineering and have been working in the field of fuel cells and related arts for over 8 years, and am currently engaged in that field on behalf of UTC Power Corporation, South Windsor, CT.
3. I have familiarized myself with the subject matter of the above-identified application, as claimed in an amendment filed September 21, 2007.
4. I have familiarized myself with the content of US patent 6,255,011 (Fujii).
5. The longitudinal flow direction (claim 1, line 4) in Fujii's Fig. 6 is from inlet 36a (column 3, line 31) (3:31 hereafter), in the direction of horizontal long-side arrow B (3:2,3) in Figs.3-6, to outlet 36b (4:1-4).
6. The merger of grooves 44a-44f in sections 92, 94 is downward (7: 35-37) which is transverse to the horizontal in Fig. 6 of Fujii.
7. The channels 44a-44f, 50a-50d do NOT each have "a transverse portion extending substantially transversely of said longitudinal direction and in fluid communication either (c) with

only one of said inlet portions or only one of said outlet portions, or (d) between one of said inlet portions and one of said outlet portions...." (Claim 1, lines 8-11)

8. There are no channels in Fujii which have downward portions of other than all being only one groove (92, 94) or all being two grooves (50a, 50b; 50c, 50d).

9. From the facts in paragraphs 5, 6 and 8, it is conclusive that Fujii does not have "some, but less than all transverse portions having more than one groove" called for in line 13 of claim 1.

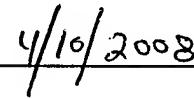
10. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

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Date

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Respectfully submitted,



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